

CLAIMS

1. Surface modified titanium dioxide fine particles comprising titanium dioxide having a surface which is modified with a hydrophilic polymer having carboxyl groups, the carboxyl groups in the hydrophilic polymer being bonded to titanium dioxide through an ester linkage.
2. The surface modified titanium dioxide fine particles according to claim 1, wherein said titanium dioxide is an anatase or rutile form of titanium dioxide.
3. The surface modified titanium dioxide fine particles according to claim 1 or 2, wherein said titanium dioxide has a particle diameter of 2 to 200 nm.
4. The surface modified titanium dioxide fine particles according to any one of claims 1 to 3, wherein said titanium dioxide is a composite titanium dioxide comprising titanium dioxide and a magnetic material.
5. The surface modified titanium dioxide fine particles according to any one of claims 1 to 4, wherein said hydrophilic polymer is a water soluble polymer.
6. The surface modified titanium dioxide fine particles according to claim 5, wherein said water soluble polymer contains a polycarboxylic acid.
7. The surface modified titanium dioxide fine particles according to claim 5, wherein said water soluble polymer comprises a copolymer having a plurality of carboxyl group units in its molecule.
8. A dispersion liquid of surface modified titanium dioxide fine particles, comprising the surface modified titanium dioxide fine particles according to any one of claims 1 to 7 dispersed in an aqueous solvent.
9. The dispersion liquid of surface modified titanium dioxide fine

particles according to claim 8, wherein said aqueous solvent has a pH value of 3 to 13.

10. The dispersion liquid of surface modified titanium dioxide fine particles according to claim 9, wherein said aqueous solvent is a pH buffer solution.

11. The dispersion liquid of surface modified titanium dioxide fine particles according to claim 9, wherein said aqueous solvent is physiological saline.

12. The dispersion liquid of surface modified titanium dioxide fine particles according to any one of claims 9 to 11, for use as an auxiliary material for phototherapy in which the auxiliary material is introduced into the body in its affected region and light such as ultraviolet light is then applied to the affected region to destroy the affected region.

13. The dispersion liquid of surface modified titanium dioxide fine particles according to claim 12, wherein said affected region is a cancer tissue.

14. A process for producing surface modified titanium dioxide fine particles by chemically bonding a hydrophilic polymer to the surface of titanium dioxide fine particles, said process comprising: (1) the first step of dispersing a titanium dioxide sol in a solvent; (2) the second step of dispersing a hydrophilic polymer in a solvent; (3) the third step of mixing the two dispersion liquids together; (4) the fourth step of heating the mixed liquid; (5) the fifth step of separating the surface modified titanium dioxide fine particles from the hydrophilic polymer remaining unbonded; and (6) the sixth step of purifying the surface modified titanium dioxide fine particles.

15. The process for producing surface modified titanium dioxide fine particles according to claim 14, wherein the solvent used in the first step and the solvent used in the second step are an aprotic solvent.

16. The process for producing surface modified titanium dioxide fine particles according to claim 15, wherein said aprotic solvent is any of dimethylformamide, dioxane, and dimethylsulfoxide.

17. The process for producing surface modified titanium dioxide fine particles according to any one of claims 14 to 16, wherein that the heating temperature in the fourth step is 80 to 220°C.

18. The process for producing surface modified titanium dioxide fine particles according to any one of claims 14 to 17, wherein that the fifth step for the separation comprises the step of adjusting the mixed liquid to pH not more than 2.8 to allow only the surface modified titanium dioxide fine particles to cause isoelectric coagulation, whereby the hydrophilic polymer remaining unbonded as the supernatant is removed.

19. The process for producing surface modified titanium dioxide fine particles according to any one of claims 14 to 17, wherein that the fifth step for the separation comprises the step of removing the hydrophilic molecules remaining unbonded by molecular sieves.

20. The process for producing surface modified titanium dioxide fine particles according to any one of claims 14 to 19, wherein that the sixth step for the purification comprises the step of dispersing the surface modified titanium dioxide fine particles in an aqueous solvent and then drying the fine particles.

21. The process for producing surface modified titanium dioxide fine particles according to any one of claims 14 to 19, wherein that the sixth step for the purification comprises the step of dispersing the surface modified titanium dioxide fine particles in an aqueous solvent and then precipitating the surface modified titanium dioxide by salting-out.

22. The process for producing surface modified titanium dioxide fine particles according to any one of claims 14 to 19, wherein that the sixth step for the purification comprises the step of dispersing the surface modified titanium dioxide fine particles in an aqueous solvent and then

precipitating the surface modified titanium dioxide fine particles from an organic solvent.